

**REMARKS**

Claims 1-11 are pending in this application. By this Amendment, claims 1 and 5 are amended. Support for the amendments to the claims may be found, for example, in the specification at page 18, lines 4-10. No new matter is added.

In view of the foregoing amendments and following remarks, reconsideration and allowance are respectfully requested.

**I. Rejections Under 35 U.S.C. § 112**

The Office Action rejects claim 1 as being indefinite under 35 U.S.C. §112, second paragraph. By this Amendment, claim 1 is amended in light of the Examiner's comments. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

**II. Rejections Under 35 U.S.C. §103**

**A. Hunter, Vodakov and Lundberg**

The Office Action rejects claims 1, 2 and 4 under 35 U.S.C. §103(a) over U.S. Patent No. 6,086,672 to Hunter ("Hunter") in view of U.S. Patent No. 6,863,728 to Vodakov et al. ("Vodakov") in view of U.S. Patent No. 4,349,407 to Lundberg ("Lundberg").<sup>1</sup> Applicants respectfully traverse the rejection.

By this Amendment, claim 1 recites, *inter alia*, "A method of production of a silicon carbide single crystal by precipitation from a solution using a temperature gradient furnace giving a temperature gradient to a columnar workpiece in its longitudinal direction, comprising ... using an inside cylindrical susceptor tightly surrounding the outer circumference of said columnar workpiece." Hunter, Vodakov and Lundberg fail to teach or suggest at least the above features of the claimed method.

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<sup>1</sup> See Interview Summary mailed December 12, 2008 stating that the rejection of claim 4 should be included with the rejection of claims 1 and 2.

The Office Action asserts that Hunter discloses the growth of a bulk single crystal containing silicon carbide in a highly non-uniform thermal gradient furnace. The Office Action cites to Hunter, col. 2, lines 37-45 to support this assertion. However, this portion of Hunter discloses that a feature of its growth system is that it provides a significant decrease in the ratio of crucible height to diameter "while maintaining a uniform thermal profile across the growing crystal interface." Hunter, col. 2, lines 39-40 (emphasis added). Thus, Hunter is directed to a growth system that provides a uniform thermal profile while claim 1 recites applying a "temperature gradient to a columnar workpiece in its longitudinal direction...." Hunter does disclose a thermal gradient between the source and the growing crystal interface, but Hunter does not disclose, teach or suggest applying a temperature gradient to a columnar workpiece in its longitudinal direction. See Hunter, col. 2, lines 54-55. Therefore, Hunter fails to disclose, teach or suggest the above feature of claim 1. Further, Vodakov and Lundberg are not applied to address the above discrepancy of Hunter as to claim 1, as discussed below.

The Office Action further asserts that Vodakov discloses that a seed crystal is sealed within a multi-element system including a ring element, which the Office Action asserts discloses the claimed "inside cylindrical susceptor." The Office Action cites Fig. 4 of Vodakov to support this assertion. Thus, the Office Action asserts that it would have been obvious to one of ordinary skill in the art to have used the ring element of Vodakov in the growth system of Hunter. However, the ring element of Vodakov has conical inner surfaces, and the seed crystal is pressed and sealed to a top portion of the ring element using a gas impermeable graphite foil. See Vodakov, col. 5, lines 54-62. Vodakov further discloses that the inner diameter of the ring element 407 adjacent to seed crystal 401 is smaller than the outer diameter of crystal 401. See Vodakov, col. 5, lines 63-65. Therefore, the ring element of Vodakov cannot surround the seed crystal. Further, as can be seen in Fig. 4 of Vodakov,

element 407 does not surround the stack, which comprises a heat sink (413), a holder for the seed crystal (405), the seed crystal (401), and the graphite cylinder (415). See Vodakov, Fig. 4 and col. 6, lines 34-37.

However, the claimed "inside cylindrical susceptor" tightly surrounds the outer circumference of the columnar workpiece, which includes a source material rod comprised of silicon carbide, a solvent, a seed crystal, and a support rod supporting said seed crystal at the bottom end of the support rod. Thus, the claimed "inside cylindrical susceptor" is in close contact with the outer circumference of the columnar workpiece in order to achieve uniform in-plane temperature distribution. See specification, page 5, line 30 - page 6, line 12. As discussed above, the ring element of Vodakov does not surround the stack components and, thus, will not be effective at achieving uniform in-plane temperature distribution. Therefore, at least because the ring element of Vodakov does not surround the stack components, it would not have been obvious to one of ordinary skill in the art from the disclosures of Hunter and Vodakov, individually or in combination, to have modified the disclosure of Hunter to include an "inside cylindrical susceptor" that surrounds the outer circumference of the columnar workpiece, as is recited in claim 1.

Further, Lundberg is not applied to address the above discrepancies of Hunter and Vodakov as to claim 1. Lundberg is merely applied as disclosing a method of growing single crystals of SiC using a solvent of molten lithium. Thus, Hunter, Vodakov and Lundberg, individually or in combination, fail to teach or suggest each and every feature of claim 1.

Claim 1 would not have been rendered obvious by Hunter, Vodakov and Lundberg, individually or in combination. Claims 2 and 4 depend from claim 1 and, thus, also would not have been rendered obvious by Hunter, Vodakov and Lundberg, individually or in combination. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

**B. Hunter, Vodakov, Lundberg and Okojie**

The Office Action rejects claims 3, 5, 6, 8, 9 and 10 under 35 U.S.C. §103(a) over Hunter in view of Vodakov in view of Lundberg as applied to claims 1 and 2, and further in view of U.S. Patent No. 6,794,213 to Okojie et al. ("Okojie"). Applicants respectfully traverse the rejection.

Regarding claims 3, 8, 9 and 10, for at least the reasons stated above, Hunter, Vodakov and Lundberg, individually or in combination, fail to teach or suggest each and every feature of claim 1. The Office Action applies Okojie as disclosing a counter bore. Thus, Okojie is not applied to address the above discrepancies of Hunter, Vodakov and Lundberg as to claim 1. Therefore Hunter, Vodakov, Lundberg and Okojie, individually or in combination, fail to teach or suggest each and every feature of claim 1, from which claims 3, 8, 9 and 10 depend.

Regarding claims 3, 5, 6, 8 and 10, all of which are directed to, or depend from a claim that is directed to, a source material rod provided with a counter bore at its top face, the Office Action asserts that Okojie discloses a counter bore and that it would have been obvious to one of ordinary skill in the art to have combined Okojie with the above combination of Hunter, Vodakov and Lundberg because, the Office Action asserts, the counter bore allows for greater control over growth of the crystal and contact with the solvent. However, Applicants respectfully submit that the Office Action's combination of Hunter, Vodakov, Lundberg and Okojie applies an impermissible use of hindsight reasoning that uses the applicants own disclosure as a roadmap to yield the asserted combination.

Okojie is directed to a silicon carbide high-temperature anemometer that includes a stainless steel body with a plurality of bores, "each of which extends into a threaded counter-bore" and "a plurality of fasteners ... are received within in [sic] each of the bores and counter-bores to hold the shim and sensor package securely within the body." Okojie, col. 3,

lines 54-55 and col. 4, lines 5-8 (internal references omitted). Thus, Okojie merely discloses the use of counter bores as a means to fasten together two portions of an anemometer body that enclose silicon carbide substrates.

The first factual inquiry for determining obviousness set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 549 (1996) is to determine the scope and contents of the prior art. Hunter, Vodakov and Lundberg are all directed to methods or apparatuses for growing silicon carbide crystals. The present application is also directed to growing a silicon carbide crystal. However, Okojie is directed to a method of assembling a silicon carbide high-temperature anemometer. See Okojie, title and abstract. The Office Action provides no assertion, argument or support that the field of growing silicon carbide crystals and assembling anemometers are analogous art. Other than the fact that the anemometers in Okojie contain silicon carbide substrates, there is no other technical feature that connects the Okojie reference to the other applied references or the present application. Applicants respectfully assert that the fact that the anemometers of Okojie contain silicon carbide substrates is insufficient to show that the Okojie reference is within the scope of the prior art for the present application. Therefore, one of ordinary skill in the art would not have looked to Okojie to address the discrepancies of Hunter, Vodakov and Lundberg at the time of the invention.

Additionally, even if Okojie were to have been considered within the scope of the prior art of the present application, none of the applied references disclose counter bores on the source material. As the Office Action acknowledges, on page 4, Hunter, Vodakov and Lundberg do not disclose counter bores, let alone counter bores on a source material. Further, as discussed above, Okojie merely discloses the use of counter bores to fasten together two portions of a body of an anemometer. Therefore, none of the applied references disclose that

a counter bore can or should be formed on a source material used in the process of growing silicon carbide crystals.

Further, the applied references do not provide any reason or rationale for one of ordinary skill in the art to have modified the source material of Hunter, Vodakov or Lundberg to have a counter bore as claimed. Specifically, there is no disclosure, teaching or suggestion in any of the applied references that providing a counter bore on the source material would be beneficial to growing a silicon carbide crystal. As discussed above, Hunter, Vodakov and Lundberg are silent as to counter bores on the source material, and these references do not teach or suggest that it would be beneficial to remove the seed crystal and the source material from the solvent simultaneously, which the Office Action asserts is the reason it would have been desirable to combine the Hunter, Vodakov, Lundberg and Okojie references. Further, Applicants respectfully assert that the disclosure of Okojie, which merely discloses using counter bores to fasten together two portions of an anemometer body, does not provide any reason or rationale for one of ordinary skill in the art to have provided a counter bore on the top face of the source material as claimed. Thus, Applicants respectfully assert that for at least the above reasons, the Office Action used Applicants own disclosure as a roadmap to combine the applied references to yield a method for growing a silicon carbide crystal that comprises a counter bore on the top face of the source material.

Regarding independent claim 5, in addition to reciting a counter bore on the top surface of the source material, this claim further recites, "a counter bore of an inside diameter equal to an outside diameter of said seed crystal on the top face and pulling said support rod at the time where a predetermined thickness of the single crystal is grown so as to remove said single crystal from said solvent." None of the applied references disclose, teach or suggest the above features of claim 5 at least because none of the applied references disclose, teach or suggest providing a counter bore in the source material. The above features provide

a means for removing the source material and the seed crystal from the solvent simultaneous, which reduces crystal defects. See specification, page 6, lines 13-34. None of the applied references disclose, teach or suggest that it would have been beneficial to remove the source material and the seed crystal from the solvent simultaneously and, thus, none of the applied references, individually or in combination teach or suggest the counter bores as claimed.

For at least the reasons stated above, claims 1 and 5 would not have been rendered obvious by Hunter, Vodakov, Lundberg and Okojie, individually or in combination. Claims 3, 6, 8, 9 and 10 variously depend from claims 1 and 5 and, thus, also would not have been rendered obvious by Hunter, Vodakov, Lundberg and Okojie, individually or in combination, at least for their dependence from claims 1 and 5 as well as for the additional features that they recite. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

**C. Hunter, Vodakov, Lundberg, Okojie and Gwo**

The Office Action rejects claims 7 and 11 under 35 U.S.C. §103(a) over Hunter, in view of Vodakov, Lundberg and Okojie as applied to claims 3, 5, 6, 8, 9 and 10, and further in view of U.S. Patent Application Publication No. 2005/0106849 to Gwo ("Gwo"). Applicants respectfully traverse the rejection.

For at least the reasons stated above, Hunter, Vodakov, Lundberg and Okojie fail to teach or suggest each and every feature of claim 5. Further, Gwo is not applied to address the above discrepancies of Hunter, Vodakov, Lundberg and Okojie as to claim 5. The Office Action merely applies Gwo as disclosing a buffer mechanism. Thus, Hunter, Vodakov, Lundberg, Okojie and Gwo, individually or in combination, fail to teach or suggest each and every feature of claim 5.

Claim 5 would not have been rendered obvious by Hunter, Vodakov, Lundberg, Okojie and Gwo, individually or in combination. Claims 7 and 11 depend from claim 5 and,

thus, also would not have been rendered obvious by Hunter, Vodakov, Lundberg, Okojie and Gwo, individually or in combination. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

**III. Conclusion**

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Date: February 10, 2009

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